SHARP SERVICE MANUAL

CODE : 00ZXEA41SUSME

LEAD-FREE SOLDER MODEL

ELECTRIC CASH REGISTER

MODEL XE-A41S

SRV KEY : Not necessary
PRINTER : PR-45MII

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■ LEAD-FREE SOLDER

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Parts marked with "⚠" are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

SHARP CORPORATION

This document has been published to be used for after sales service only.
The contents are subject to change without notice.

CAUTION

RISK OF EXPLOSION IF BATTERY IS REPLACED
BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING
TO THE INSTRUCTIONS.
AVOID: SHORT-CIRCUITING THE BATTERY TERMINALS.
KEEP THE BATTERY AWAY FROM FIRE.

∗ WHEN DISPOSING THE BATTERY, FOLLOW THE LOCAL
RULES AND REGULATIONS.

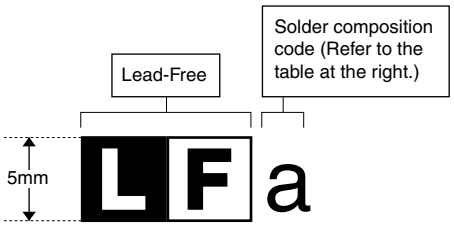
"BATTERY DISPOSAL"

THIS PRODUCT CONTAINS NICKEL-METAL HYDRIDE BATTERY.
THIS BATTERY MUST BE DISPOSED OF PROPERLY.
REMOVE THE BATTERY FROM THE PRODUCT AND CONTACT FEDERAL OR
STATE ENVIRONMENTAL AGENCIES FOR INFORMATION ON RECYCLING AND
DISPOSAL OPTIONS.

■ LEAD-FREE SOLDER

The PWB' s of this model employs lead-free solder. The “LF” marks indicated on the PWB's and the Service Manual mean “Lead-Free” solder. The alphabet following the LF mark shows the kind of lead-free solder.

Example:



<Solder composition code of lead-free solder>

Solder composition	Solder composition code
Sn-Ag-Cu	a
Sn-Ag-Bi Sn-Ag-Bi-Cu	b
Sn-Zn-Bi	z
Sn-In-Ag-Bi	i
Sn-Cu-Ni	n
Sn-Ag-Sb	s
Bi-Sn-Ag-P Bi-Sn-Ag	p

(1) NOTE FOR THE USE OF LEAD-FREE SOLDER THREAD

When repairing a lead-free solder PWB, use lead-free solder thread. Never use conventional lead solder thread, which may cause a breakdown or an accident.

Since the melting point of lead-free solder thread is about 40°C higher than that of conventional lead solder thread, the use of the exclusive-use soldering iron is recommendable.

(2) NOTE FOR SOLDERING WORK

Since the melting point of lead-free solder is about 220°C, which is about 40°C higher than that of conventional lead solder, and its soldering capacity is inferior to conventional one, it is apt to keep the soldering iron in contact with the PWB for longer time. This may cause land separation or may exceed the heat-resistive temperature of components. Use enough care to separate the soldering iron from the PWB when completion of soldering is confirmed.

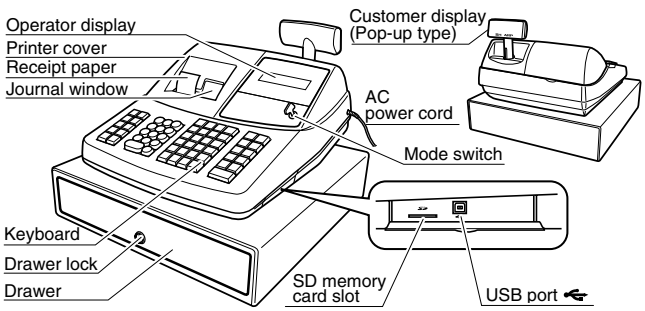
Since lead-free solder includes a greater quantity of tin, the iron tip may corrode easily. Turn ON/OFF the soldering iron power frequently.

If different-kind solder remains on the soldering iron tip, it is melted together with lead-free solder. To avoid this, clean the soldering iron tip after completion of soldering work.
If the soldering iron tip is discolored black during soldering work, clean and file the tip with steel wool or a fine filer.

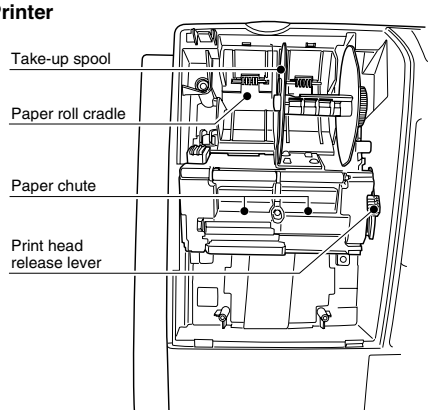
CHAPTER 1. SPECIFICATIONS

1. APPEARANCE

■ **Register front view** ■ **Register rear view**



■ **Printer**



2. RATING

Model	XE-A41S
Weight	12.5 kg
Dimensions	420 (W) x 430 (D) x 302 (H) mm
Power source	AC 120V, 60Hz
Power consumption	Stand-by 10.0W, Operating 44.0W (max.)
Working temperature	32 °F to 104 °F (0 °C to 40 °C)

3. KEYBOARD

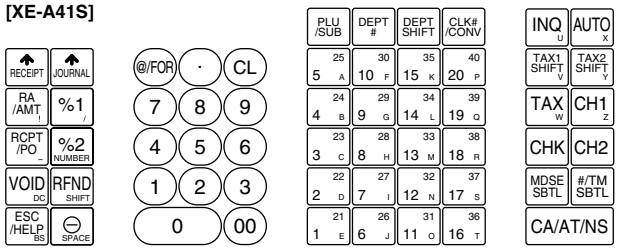
3-1. KEYBOARD LAYOUT

Type	Normal keyboard
Key position	STD/MAX 59
Key pitch	19 (W) x 19 (H) mm
Key layout	Fixed type

3-2. KEY LIST

■ **Keyboard layout**

[XE-A41S]



Note: The small characters on the bottom or lower right in each key indicates functions or characters which can be used for character entries for text programming.

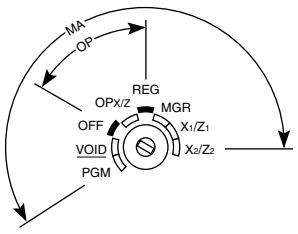
■ **Key names**

KEY TOP	DESCRIPTION
↑ (RECEIPT)	Receipt paper feed key
↑ (JOURNAL)	Journal paper feed key
RA/AMT	Received-on account/Amount key
RCPT/PO	Receipt print/Paid-out key
VOID	Void key
ESC/HELP	Escape/Help key
%1, %2	Percent 1and 2 key
RFND	Refund key
⊖	Discount key
@/FOR	Multiplication key
•	Decimal point key
CL	Clear key
00, 0-9	Numeric Keys
PLU/SUB	PLU/Sub-department key
DEPT#	Department code entry key
DEPT SHIFT	Department shift key
CLK# CONV	Clerk code entry/Conversion key
Dept1-40	Department keys
INQ	Inquiry key
Tax 1 SHIFT, Tax 2 SHIFT	Tax 1 and 2 shift key
AUTO	Automatic sequence key
TAX	Tax key
CHK	Check key
CH1, CH2	Charge 1 and 2 keys
MDSE SBTL	Merchandise subtotal key
#/TM SBTL	Non-add code/Time display/Subtotal key
CA/AT/NS	Total/Amount tender/Non Sale key

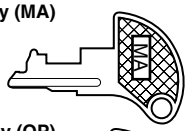
4. MODE SWITCH

4-1. LAYOUT

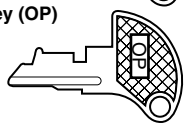
• Rotary type



Manager key (MA)



Operator key (OP)



The mode switch can be operated by inserting one of the two supplied mode keys - manager (MA) and operator (OP) keys. These keys can be inserted or removed only in the “REG” or “OFF” position.

The mode switch has these settings:

OFF: This mode locks all register operations. (AC power turns off.) No change occurs to register data.

OP X/Z: To take individual clerk X or Z reports, and to take flash reports.

It can be used to toggle receipt state “ON” and “OFF” by pressing he [RCP/PO] key.

REG: For entering sales.

PGM: To program various items.

VOID: Enters into the void mode. This mode allows correction after finalizing a transaction.

MGR: For manager’s entries. The manager can use this mode for an override entry.

X1/Z1: To take the X/Z report for various daily totals.

X2/Z2: To take the X/Z report for periodic (weekly or monthly) consolidation.

5. DISPLAY

5-1. OPERATOR DISPLAY

Display device : STN LCD module

Number of line : 2 line

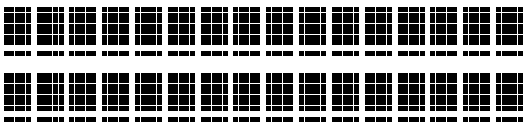
Number of digits : 16 positions

Color of display : Yellow Green / Orange

Character form : 5 x 7 dots

Character size : 8.0 (H) x 4.8 (W) mm

Layout:



5-2. CUSTOMER DISPLAY

Display device : LED

Number of line : 1 line

Number of digits : 7 digits

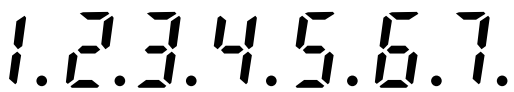
Color of display : Yellow Green

Style : Pop up type

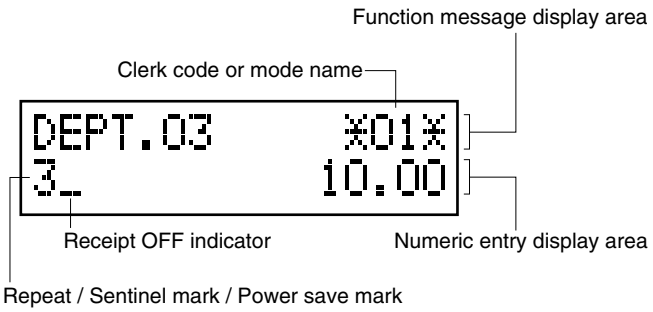
Character form : 7 segment + Dp

Character size : 14.0mm (H) x 8.0mm (W)

Layout:



■Operator display



- Clerk code or Mode name

  The mode you are in is displayed. When a clerk is assigned, the clerk code is displayed in the REG or OP X/Z mode. For example, “*01*” is displayed when clerk 01 is assigned.

- Repeat

  The number of repeats is displayed, starting at “2” and incremental with each repeat. When you have registered ten times, the display will show “0” (2 → 3.....9 → 0 → 1 → 2...)

- Sentinel mark

  When amount in the drawer reaches the amount you preprogrammed, the sentinel mark “X” is displayed to advise you to remove the money to a safe place.

- Power save mark

  When the cash register goes into the power save mode, the power save mark (decimal point) lights up.

- Function message display area

  Item labels of departments and PLU/UPCs and function texts you use, such as %1, (-) and CASH are displayed.

  When an amount is to be entered, ------ is displayed at the numeric entry area with a guidance message “ENTER PRICE”.

- Numeric entry display area

  Numbers entered using numeric keys are displayed here.

Date and time display

Date and time appear on the display in the OP X/Z, REG, or MGR mode. In the REG or MGR mode, press the [#/TM/SBTL] key to display the date and time.

Backlight of the LCD display

When an error occurs or the [RFND] or [VOID] key is pressed or enter the void mode, the green backlight will turn red.

Error message

When an error occurs, the corresponding error message is displayed in the function message display area.

■Customer display (Pop-up type)

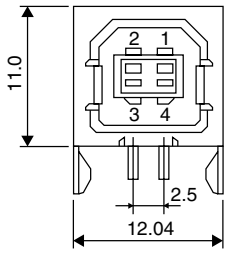
6. USB port

[DEVICE]

USB B Type

[OUTLINE]

This ECR has 1 port.
This is used in order to connect with a personal computer.



[SPECIFICATIONS]

1) Transmission rate : USB 2.0 Full Speed Max 12Mbps
2) Connector : USB B type
3) Pin assign : 1Pin 5V
: 2Pin -D
: 3Pin +D
: 4Pin GND

7. PRINTER

7-1. PRINTER

- Part number : PR-45M II
- NO. of station : 2 (Receipt and journal)
- Validation : No
- Printing system : Line thermal
- No. of dot : Receipt 288 dots
  Journal 288 dots
- Dot pitch : Horizontal 0.125mm
  Vertical 0.125mm
- Font : 10 dots (W) × 24 dots (H)
- Printing capacity : Receipt max. 24 characters
  Journal max. 24 characters
- Character size : 1.25mm (W) × 3.0mm (H) at 10 × 24 dots
- Print pitch : Column distance 1.5mm
  Row distance 3.75mm
- Print speed : Approximate 50mm/s (13.3 lines/sec)
- Paper feed speed (Manual feed) : Approximate 40mm/s
- Reliability : Mechanism MCBF 5 million lines
  Head life 12.5 million characters
  (at 4 dots/1 character/1 element)
- Paper end sensor : Set up (Receipt and journal)
- Cutter : Manual
- Near end sensor : No

7-2. PAPER

- Paper roll dimension: 44.5 ± 0.5mm in width
  Max. 80mm in diameter
- Paper quality : (Journal/Receipt)
  High-quality paper
  paper thickness: 0.06 to 0.08mm
  Nihon seisi thermal paper : TF50KS-E
  Oji thermal paper : PD150R, PD160R

7-3. LOGO STAMP

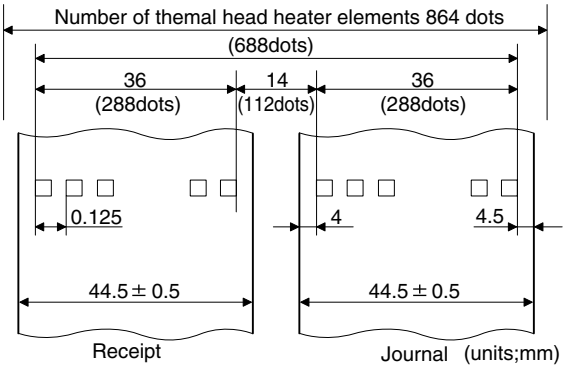
- No

7-4. CUTTER

- Method : Manual

7-5. PRINTING AREA

Receipt & Journal



8. SD MEMORY CARD SLOT

[DEVICE]

SD Card (Version. 1.01)

[OUTLINE]

XE-A41S has a SD Memory Card Slot.

[SPECIFICATIONS]

Variable clock rate : 0-25MHz
Other commands and memory access : 2.7-3.6V
Bus Protocol : SPI Bus
Correspondence capacity : 256MB-512MB
Recommended manufacturer : SanDisk

9. DRAWER

[OUTLINE]

- Standard equipment: Yes
- Max. number of additional drawers: 1
- The drawer consists of:
  1) Drawer box (outer case) and drawer
  2) Coin case
  3) Money case
  4) Lock (attached to the drawer)

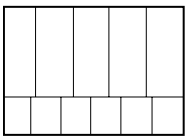
[SPECIFICATION]

9-1. DRAWER BOX AND DRAWER

Model name of the drawer box	SJ423
Size	420 (W) x 427 (D) x 114 (H) mm
color	Gray (PB-N8.0)
Material	Metal
Bell	–
Release lever	Standard equipment: situated at the bottom
Drawer open sensor	–

9-2. MONEY CASE

Separation from the drawer	Disallowed
Separation of the bill compartments from the coin compartments	Allowed
Bill separator	–
Number of compartments	5B/6C

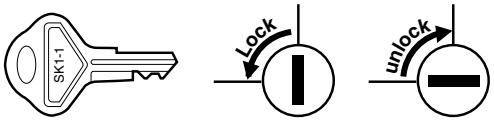


5B/6C

9-3. LOCK (LOCK KEY : LKGIM7331BHZZ)

- Location of the lock: Front
- Method of locking and unlocking:

  To lock, insert the drawer lock key into the lock and turn it 90 degrees counter clockwise.
  To unlock, insert the drawer lock key and turn it 90 degrees clockwise.
- Key No: SK1



10.BATTERY

10-1.MEMORY BACK UP BATTERY

Type : Rechargeable battery

Number of battery : 1pcs as standard RBRC license

CHAPTER 2. OPTIONS

1. OPTIONS (NO)

2. SERVICE OPTIONS

NO	NAME	PARTS CODE	PRICE RANK	DESCRIPTION
1	Spill-proof cover	XXXXXXXXXXX	XXX	

3. SUPPLIES

NO	NAME	PARTS CODE	PRICE RANK	DESCRIPTION
1	Thermal roll paper	TPAPR6645RC05	AY	5 ROLLS/PACK

4. SPECIAL SERVICE TOOLS (NO)

CHAPTER 3. MASTER RESET AND PROGRAM RESET

1. MASTER RESETTING

Master resetting clears the entire memory and resumes initial values.

Master resetting can be accomplished by using the following procedure:

Procedure A:
1) Unplug the AC cord from the wall outlet.
2) Set the mode switch to the PGM position.
3) While holding down both the JOURNAL FEED key and [CL] key, plug in the AC cord to the wall outlet.

2. PROGRAM RESETTING (INITIALIZATION)

This resetting resumes the initial program without clearing memory.

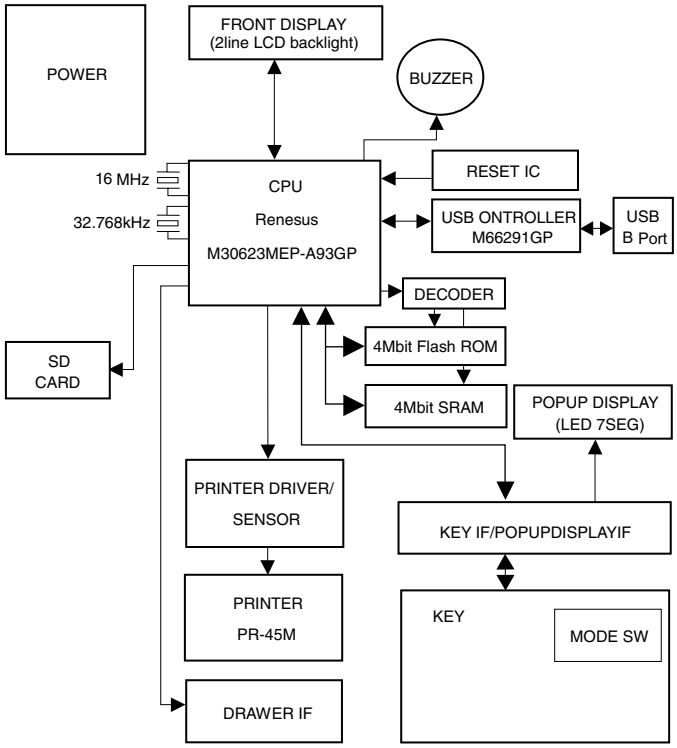
This resetting can be operated at below sequence in PGM mode.

Procedure:
1) Unplug the AC cord from the wall outlet.
2) Set the mode switch to the PGM position.
3) While holding down both JOURNAL FEED key and RECEIPT FEED key, plug in the AC cord to the wall outlet.

CHAPTER 4. HARDWARE DESCRIPTION

1. BLOCK DIAGRAM

The block diagram of the XE-A41S is shown below.



CPU

Renesus-make M30623MEP-A93GP
(Internal RAM 12KB, internal ROM 192KB)

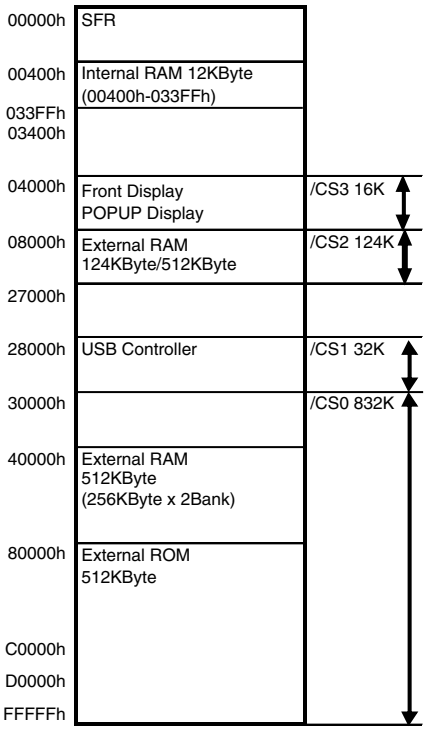
EXTERNAL MEMORY

RAM	512KB
	CYPRESS CY62148ELL-45ZSXIT
FLASH ROM	512KB
SPANSION	MBM29F400TC-70PFTN

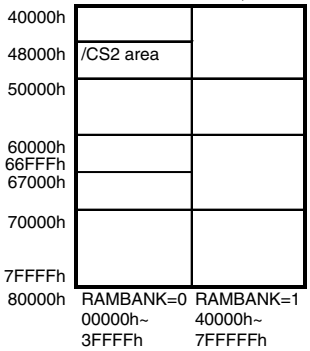
PRINTER PR45M

2. MEMORY MAP

2-1. ADDRESS MAP



External RAM/CS2 area:
When RAMBANK=0, 48000h-66FFFh is shadow



3. CPU SETTING

3-1. OUTLINE

Model : M30623MEP-A93GP

Internal RAM :	12 KByte
Internal ROM :	192 KByte
Operation clock :	16 MHz
Sub clock :	32.768 KHz
External data bus :	8 bit

3-2. WEIGHT SETTING

CS0# (FLASH ROM and EXTERNAL SRAM)	3 BCLK
CS1# (USB CONTROLLER)	3 BCLK
CS2# (EXTERNAL SRAM IMAGE SPACE)	3 BCLK
CS3# (FRONT/POPUP DISPLAY)	2 BCLK

4. I/O

M16C/24 PORT MEMORY SPACE: NORMAL MODE
PROCESSOR MODE: MICRO PROCESSOR MODE
It is used by (SEPARATE BUS 8bit Width)

PORT	PIN No.	I/O	Pin name	Signal name	Initial value	OFF MODE	Function	PORT	PIN No.	I/O	Pin name	Signal name	Initial value	OFF MODE	Function
P00	88	I/O		D0		Out L		P54	42	O	/HLDA	(NU)		Out L	
P01	87	I/O	D1	D1		Out L		P55	41	I	/HOLD	/HOLD		In	
P02	86	I/O	D2	D2		Out L		P56	40	O	ALE	(NU)		Out L	
P03	85	I/O	D3	D3		Out L		P57	39	I	/RDY	/RDY		In	
P04	84	I/O	D4	D4		Out L		P60	38	O	P60	DR1	L	Out L	DRAWER 1 DRIVE SIGNAL
P05	83	I/O	D5	D5		Out L		P61	37	O	CLK0	FSCK(NU)	L	Out L	FMC FSCK
P06	82	I/O	D6	D6		Out L		P62	36	I	RXD0	FRD(NU)	L	Out L	FMC FRD
P07	81	I/O	D7	D7		Out L		P63	35	O	TXD0	FSD (NU)	L	Out L	FMC FSD
P10	80	O	P10	RAS	L	Out L	RECEIPT PAPER FEED A	P64	34	O	/RTS1	/RS	H	Out L	RS-232 /RS
P11	79	O	P11	RBS	L	Out L	RECEIPT PAPER FEED B	P65	33	O	P65	/FRES(NU)	L	Out L	FMC /FRES
P12	78	O	P12	RCS	L	Out L	RECEIPT PAPER FEED C	P66	32	I	RXD1	RD		In	RS-232 RD
P13	77	O	P13	RDS	L	Out L	RECEIPT PAPER FEED D	P67	31	O	TXD1	SD	H	Out L	RS-232 SD
P14	76	O	P14	JAS	L	Out L	JOURNAL PAPER FEED A	P70	30	O	TXD2	SO	L	Out L	PRINTER DATA OUT
P15	75	O	P15	JBS	L	Out L	JOURNAL PAPER FEED B	P71	29	I	RXD2	SI		In	PRINTER DATA IN
P16	74	O	P16	JCS	L	Out L	JOURNAL PAPER FEED C	P72	28	O	CLK2	PCLK	L	Out L	PRINTER CLOCK
P17	73	O	P17	JDS	L	Out L	JOURNAL PAPER FEED D	P73	27	O	P73	DR2	L	Out L	DRAWER 2 DRIVE SIGNAL
P20	72	O	A0	A0		Out L		P74	26	O	P74	/ER	H	Out L	RS-232 /ER
P21	71	O	A1	A1		Out L		P75	25	I	P75	/CD		In	RS-232 /CD
P22	70	O	A2	A2		Out L		P76	24	I	P76	/CS		In	RS-232 /CS
P23	69	O	A3	A3		Out L		P77	23	I	P77	/DR		In	RS-232 /DR
P24	68	O	A4	A4		Out L		P80	22	O	P80	BUZZER	L	Out L	
P25	67	O	A5	A5		Out L		P81	21	O	P81	VHCOM	L	In	PRINTER HEAD CONTROL
P26	66	O	A6	A6		Out L		P82	20	I	/INT0	POFF		In	
P27	65	O	A7	A7		Out L		P83	19	I	/INT1	/FRDY(NU)	L	Out L	FMC /FRDY
P30	63	O	A8	A8		Out L		P84	18	O	P84	/BUSY(NU)	L	Out L	FMC #BUSY
P31	61	O	A9	A9		Out L		P85	17	I	/NMI	/NMI(NU)		In	
P32	60	O	A10	A10		Out L		P86	11	O	XCOUT	XCOUT			32.768kHz
P33	59	O	A11	A11		Out L		P87	10	I	XCIN	XCIN			32.768kHz
P34	58	O	A12	A12		Out L		P90	7	I	P90	MODE		In	MODE KEY SENSE
P35	57	O	A13	A13		Out L		P91	6	I	P91	MSENS		In	MISCELLANEOUS SENSE
P36	56	O	A14	A14		Out L		P92	5	O	P92	BA1	L	Out L	BANK signal 1
P37	55	O	A15	A15		Out L		P93	4	O	P93	BA0	L	Out L	BANK signal 0
P40	54	O	A16	A16		Out L		P94	3	O	P94	DATA /CE	L	Out L	LCD DATA LATCH signal
P41	53	O	A17	A17		Out L		P95	2	O	P95	BLON	L	Out L	BACK LIGHT ON
P42	52	O	A18	A18		Out L		P96	1	O	P96	LCDON	L	Out L	LCD POWER ON
P43	51	O	A19	A19		Out L		P97	100	I	P97	IPLON		In	IPL ON signal
P44	50	O	/CS0	/CS0		Out H		P100	97	I	AN0	TM		In	HEAD temperature monitor
P45	49	O	/CS1	/CS1		Out L		P101	95	I	AN1	VPTEST		In	HEAD voltage monitor
P46	48	O	/CS2	/CS2		Out H		P102	94	I	AN2	VREF		In	Reference voltage
P47	47	O	/CS3	/CS3		Out L		P103	93	O	AN3	/STRB1	H	In	PRINTER STORE SIGNAL 1
P50	46	O	/WR	/WR		Out L		P104	92	O	AN4	/STRB2	H	In	PRINTER STORE SIGNAL 2
P51	45	O	/BHE	(NU)		Out L		P105	91	O	P105	/STRB3	H	In	PRINTER STORE SIGNAL 3
P52	44	O	/RD	/RD		Out L		P106	90	O	P106	/STRB4	H	In	PRINTER STORE SIGNAL 4
P53	43	O	BCLK	BCLK		Out L		P107	89	O	P107	LATCH	L	In	PRINTER LATCH SIGNAL

Power supply/CONTROL pins

PORT	PIN No.	I/O	Pin name	Function	PORT	PIN No.	I/O	Pin name	Function
BYTE	8	I	BYTE	Connected to VCC	Vcc	62		Vcc	Connected to VCC
CNVss	9	I	CNVss	Connected to GND	Vss	64		Vss	Connected to GND
/RESET	12	I	/RESET		AVss	96		AVss	Connected to GND
Xout	13	O	Xout	OPEN	Vref	98		Vref	Connected to VCC
Vss	14		Vss	Connected to GND	AVcc	99		AVcc	Connected to VCC
Xin	15	I	Xin	Connected to Spectram diffusion IC					
Vcc	16		Vcc	Connected to VCC					

5. DISPLAY

5-1. FRONT DISPLAY

The LCD display of 5 x 7dot, 2 lines, and 16 digits with the parallel IF specifications using SPLC780C.

LCD-related Register

Function	Address	R/W
LCD Write Data	04001h (CS3 space)	W
LCD Read Data	04001h (CS3 space)	R

LCD Control Signal

Pin No.	CPU PORT	Signal name	Remark
46	P137	LCDE	Enable Signal ⎍⎍ Enable
122	P105	LCDON	H : LCD ON L : LCD OFF
121	P106	LCDRW	H : Data read L : Data Write
120	P107	LCDRS	H : Data input L : Instruction Input
48	P135	BLON0	LCD Backlight Orange ON signal
47	P136	BLON1	LCD Backlight Yellow Green ON signal
32	P73	LCDCS#	L : LCD write data latch

5-2. REAR (POPUP) DISPLAY

The rear display is of 7-digit, 7-segment LED.

Display digit signal

The four signals KS0~KS3 are assigned to the CPU port, and decoded to the strobe signals of 16 lines externally.

Function	Signal name	CPU PORT	Remark
POPUP DISPLAY DIGIT signal and KEY STROBE signal	KS0	P120	KS3 is decoded as MSB outside the CPU to be S0~S15. KS3 is used as the MSB. KS3~KS0 are decoded to be /S0~/S15. (KS3~KS0 are active at "H")
	KS1	P121	
	KS2	P122	
	KS3	P123	

Display SEGMENT signal

By writing the segment data to the /CS3 space, the LED segment signal can be outputted.

Function	Address	R/W
POPUP DISPLAY Data	04000h (CS3 space)	W

Each bit correspondence

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bir1	Bit0
04000h	dp	g	f	e	d	c	b	a

6. KEY SCAN

6-1. STROBE SIGNAL

The 16 strobe signals common with the display digit signal are used.

6-2. RETURN SIGNAL

With the 10 return signal of the CPU port, the key status and the mode key status are detected.

Signal name	CPU PORT	Remark
KR0	P90	Key Return signal 0
KR1	P91	Key Return signal 1
KR2	P92	Key Return signal 2
KR3	P93	Key Return signal 3
KR4	P94	Key Return signal 4
KR5	P95	Key Return signal 5
KR6	P96	Key Return signal 6
KR7	P97	Key Return signal 7
MODR	P124	Mode key position read signal
RJR	P134	Receipt/Journal key read signal

7. PRINTER CONTROL

7-1. STEPPING MOTOR CONTROL

The stepping motor is driven by the STA471A made by Sanken at a constant voltage.
1step : 0.125mm, 1dot : 1step
Print speed 50mm/s

<CPU PORT>

PIN No.	CPU PORT	Use signal
80	P10	RAS
79	P11	RBS
78	P12	RCS
77	P13	RDS
76	P14	JAS
75	P15	JBS
74	P16	JCS
73	P17	JDS

<Drive STEP>

RECEIPT MOTOR

	Driver IC input (CPU output)				Motor drive signal			
STEP	RAS	RBS	RCS	RDS	/RPFA	/RPFB	/RPFC	/RPFD
1	H	L	L	H	L	H	H	L
2	L	H	L	H	H	L	H	L
3	L	H	H	L	H	L	L	H
4	H	L	H	L	L	H	L	H

JOURNAL MOTOR

	Driver IC input (CPU output)				Motor drive signal			
STEP	JAS	JBS	JCS	JDS	/JPFA	/JPFB	/JPFC	/JPFD
1	L	H	H	L	H	L	L	H
2	L	H	L	H	H	L	H	L
3	H	L	L	H	L	H	H	L
4	H	L	H	L	L	H	L	H

7-2. HEAD CONTROL

HEAD : All 832 dots
Printable area (Receipt side) 384 dots
(Journal side) 384 dots

<CPU PORT>

PIN No.	CPU PORT	Use signal	Remark
30	P70	SO	Printer DATA signal
29	P61	SI	Not used
28	P72	PCLK	Printer Clock signal
93	P114	/STB1	Strobe signal 1
92	P115	/STB2	Strobe signal 2
91	P116	/STB3	Strobe signal 3
90	P117	/STB4	Strobe signal 4
89	P110	LATCH	Printer DATA Latch
21	P71	VHCOM	Printer power control signal

8. A/D CONVERSION

The following three signals are inputted to the A/D conversion port.
A/D conversion is made in 9 bits.

<CPU PORT>

PIN No.	CPU PORT	Use signal	Function
128	AN0	VREF	Reference voltage
126	AN1	HTEMP	PRINTER HEAD temperature
125	AN2	VPTEST1	PRINTER HEAD voltage

8-1. REFERENCE VOLTAGE

The reference voltage (2.495V ± 0.085V) generated by KIA431F is inputted to the AN2 pin.

8-2. PRINTER HEAD TEMPERATURE

The voltage divided by the thermistor for detecting the printer head temperature and the resistor is inputted to the AN1 pin.

HEAD temperature	A/D conversion value (DEC)	Operation
Less than -10°C	464~511	MOTOR LOCK
-10°C ~ 0°C	435~464	Print in the conduction time at 0°C.
0°C ~ 70°C	116~434	Print in the conduction time specified on the PR-45M specifications.
70°C or above	0~115	MOTOR LOCK

8-3. PRITER HEAD VOLTAGE MONITOR

The voltage supplied by the printer head power and passed through the printer and divided by the resistor is inputted to the AN2 pin.
The printable voltage range for the printer is 15V~26.4V (282~497 in A/D conversion value).

9. DRAWER CONTROL

The drawer port (1CH) is provided.
Drawer solenoid drive time : 45ms (min) - 50ms (max)

Function	Signal name	CPU PORT	Remark
DRAWER drive signal	DRAWER	P141	Drawer drive at H

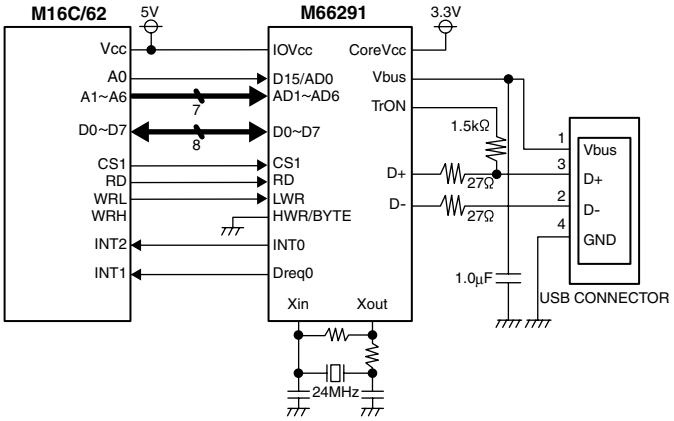
10. BUZZER CONTROL

The piezo-type buzzer is used. The oscillation frequency is 4.00kHz ± 0.25kHz.

Function	Signal name	CPU PORT	Remark
BUZZER drive signal	BUZZER	P80	Buzzer drive at H

11. USB I/F

The Renesus-make USB general-use ASSP device, M66291, is used to perform USB data send/receive. The M66291 is mapped to the /CS1 space (28000H~2FFFFFH).



<CPU PORT>

No.	CPU PORT	Use signal	Purpose
24	P83 (INT1)	/DREQUSB	USB DMA channel 0 DMA request signal
23	P84 (INT2)	/INTUSB	USB interruption 0 request signal
26	P81	/REUSB	USB controller reset signal

12. SD Card I/F

One port for SD card I/F is provided as a standard provision. It is connected with UART1 of the CPU. Communication with the SD card is made in the SPI mode.

<CPU PORT>

Pin No.	CPU PORT	Use signal	Purpose
31	P74	SD_WP#	SD card write protect detection signal
116	P113	SD_CD#	SD card insertion detection signal
118	P111	SD_CS#	SD Card Chip Select signal
117	P112	SD_POWER#	SD Card Power On signal
36	P67	SD_TXD	TxD signal
38	P66	SD_RXD	RxD signal
40	P65	SD_CLK	Serial CLK signal

13. RESET

The RESET signal is canceled when the voltage of the device which uses the 5V series (VCC, VDD, VLED) power reaches the operating voltage level.

The RESET signal is generated under the following conditions.

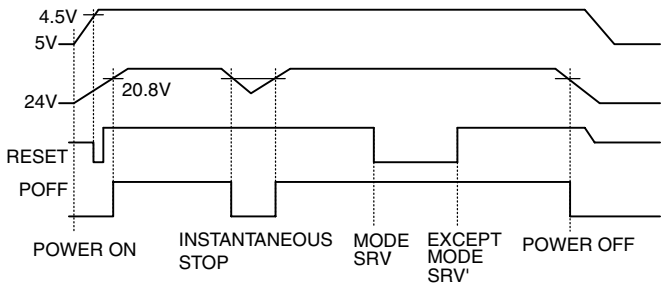
- The mode key switch is shifted from SRV' to another position (except for OFF).
- The power is turned ON after sec or more from power OFF and VCC reaches 5V.
- The mode key switch is shifted from OFF to another position (except for SRV') and VCC reaches 5V.

(When the OFF time is 5sec or less, the RESET signal may not be generated.)

14. POFF

The POFF signal is changed from 0 to 1 when the 5V series power and the 24V series power reach the operating voltage level. When it falls below the operating voltage level, it is changed from 1 to 0.

POFF, RESET timing chart



∗ When both the RESET signal and the POFF signal are high, all the functions are enabled.

CHAPTER 5. DIAGNOSTIC DESCRIPTIONS

1. LIST OF TEST ITEMS AND CODES

	Codes	Test items
1)	100	Display buzzer test
2)	102	Printer print test
3)	104	Keyboard test
4)	105	Mode switch test
5)	106	Printer sensor test
6)	107	Time display test
7)	110	Drawer open test
8)	116	LCD display test
9)	118	LCD backlight test
10)	120	External RAM test
11)	121	Internal RAM test
12)	130	External ROM test
13)	160	AD conversion port test
14)	520	USB communication test
15)	550	Sleep mode test
16)	620	SD card test

2. DIAG BOOTING

Mode SW : PRG mode

Key operation : “Above code” + “PO” key

3. DESCRIPTIONS OF EACH DIAG

1) DISPLAY BUZZER TEST

① Key operation

100 → PO

② Details of the test

The decimal point of the LED and the cursor of the LCD are shifted from the lowest digit upward one by one. (Every 200msec)
After that, all segments are lighted. (About 1sec)

③ Display/Print

OP display

D	I	S	P		B	U	Z	Z	E	R		P	G	M	
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Rear

4.	5.	6.	7.	8.	9.	0.

④ End of the test

Press any key to terminate the test, and the following print is made.

2) PRINTER PRINT TEST

① Key operation

102 → PO

② Details of the test

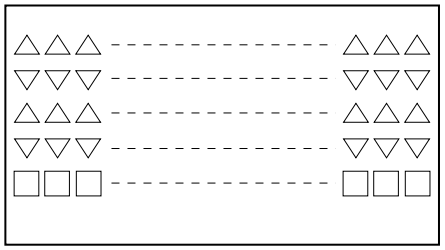
The following print pattern is printed. For the receipt side, the logo mark is also printed and a receipt is issued.

③ Display/Print

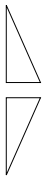
OP display

R	/	J		P	R	I	N	T	E	R		P	G	M	
													*	*	*

Print content



Patten enlargement



* As shown above, 5 lines of 30 digits are printed.

④ End of the test

After completion of printing, the test is automatically terminated.

3) KEYBOARD TEST

① Key operation

_ _ _ _104 → PO

KEY sum check code

② Details of the test

With the key code sum check code, the keyboard check is performed.
When no sum code is entered, the sum code check is made with default key arrangement.
The sum check data of each model are entered on the upper 4 digits of the diag code, and the entered data are compared with the data accumulated until the last key (CA/AT/NS) is pressed. If those data correspond with each other, the end print is made. If not, the error print is made.

③ Display/Print.

OP display

K	E	Y		B	O	A	R	D				P	G	M	
1	0	4											*	*	*

Rear

				*	*	*

* * * = KEY CODE

④ End of the test

Print

104

Error print

KEY SUM ERROR
XXXX-YYYY
104

4) MODE SWITCH TEST

① Key operation

105 → PO

② Details of the test

Shift the mode SW from “PGM” position to “X2/Z2” one by one, and return to “PGM” and check that the positions are changed in the proper sequence.

③ Display/Print

OP display

M	O	D	E		S	W						P	G	M	
1	0	5													X

Rear

						X

MODE:	PGM	VOID	OFF	OP X/Z	REG	MGR	X1/Z1	X2/Z2	PGM
X :	1	2	9	3	4	5	6	7	1

The above “X” must be read in the proper sequence. (“9” is displayed when the contact is open.)

④ End of the test

Print

105

Error print

MODE KEY ERROR
105

5) PRINTER SENSOR TEST

① Key operation

106 → PO

② Details of the test

The paper end sensor status and the head-up sensor status are checked.

③ Display/Print

OP display

R	/	J		S	E	N	S	O	R			P	G	M	
1	0	6									Z		X	–	Y

Rear

		Z		X	–	Y

X : 1 — Receipt side paper presence
0 — Receipt side paper empty
Y : 1 — Journal side paper presence
0 — Journal side paper empty
Z : 1 — Normal position
0 — Head-up position

④ End of the test

Print

106

6) TIME DISPLAY TEST

① Key operation

107 → PO

② Details of the test

The current time is displayed.

③ Display/Print

OP display

T	I	M	E	R		C	H	E	C	K		P	G	M	
								h	h	–	m	m		s	s

Rear

		h	h	–	m	m

* hh = hour, mm = minute, ss = sec

④ End of the test

When any key is pressed, the date and the time are printed and the test is terminated.

Print

yyMMdd - hhmmss
107

* yy = year, MM = month, dd = day,
hh = hour, mm = minute, ss = sec

7) DRAWER OPEN TEST

① Key operation

110 → PO

② Details of the test
The drawer is opened.

③ Display/Print

OP display

D	R	A	W	E	R							P	G	M	

④ End of the test
After opening the drawer, the end print is made and the test is automatically terminated.

Print

110

8) LCD DISPLAY TEST

① Key operation

116 → PO

② Details of the test
The display CG is checked. Check procedures: The built-in 256 CG's are divided into 16 blocks, and each block of 16 characters is displayed on the dot-display for check.
Check is started with CG code of 00H ~ 0FH. When any key is pressed, the following block is displayed sequentially.

③ Display/Print

OP display

X	Y											P	G	M	
O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O

∗ X and Y: The head code of each block is displayed in hexadecimal number.

④ End of the test
When any key is pressed, the test is terminated and the following print is made.

Print

116

9) LCD BACKLIGHT TEST

① Key operation

118 → PO

② Details of the test
The backlight ON/OFF test is performed.
First, the yellow and the green backlights are lighted. When any key is pressed, the orange backlight is lighted. When any key is pressed again, the backlight is turned off.

③ Display/Print

OP display

B	A	C	K	L	I	G	H	T				P	G	M	

④ End of the test

When any key is pressed after turning OFF the backlight, the test is terminated and the following print is made.

Print

118

10) EXTERNAL RAM TEST

① Key operation

120 → PO

② Details of the test
The external SRAM (08000H~27FFFH area and 40000H~7FFFFH) of 512Kbyte (standard provision) is checked.
The RA test is performed in the following procedures.

(1) Bus/decoder check

(2) Device check

a) Test area data save

b) Write "00H"

c) Rear comparison after "00H", write "55H"

d) Rear comparison after "55H", write "AAH"

e) Read comparison "AAH"

f) Save data restore

③ Display/Print

OP display

R	A	M										P	G	M	
1	2	0													

④ End of the test
After completion of the test, the end print is made and the test is automatically terminated.

Print

120

Error print

RAM ERROR x ∗∗∗∗∗h
XX-YY
120

∗ x = 1 : Data error, x = 2 : Address error
∗ XX-YY : XX is the anticipated data. YY is the read data.
∗ In case of an error, the error address is printed on "∗∗∗∗∗" after the abnormal end print.

11) CPU INTERNAL RAM TEST

① Key operation

121 → PO

② Details of the test
The RAM (12Kbyte) in the CPU is checked.
The RAM test is performed in the following procedure.
Device check

a) Test area data save

b) Write "00H"

c) Rear comparison after "00H", write "55H"

d) Rear comparison after "55H", write "AAH"

e) Read comparison "AAH"

f) Save data restore

③ Display/Print

OP display

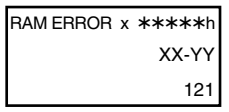
R	A	M										P	G	M	
1	2	1													

④ End of the test

After completion of the test, the end print is made and the test is automatically terminated.

Print

Error print



∗ x = 1 : Data error, x = 2 : Address error
∗ XX-YY : XX is the anticipated data. YY is the read data.
∗ In case of an error, the error address is printed on "*****" after the abnormal end print.

12) EXTERNAL ROM TEST

① Key operation

130 → PO

② Details of the test

The check sum of the external Flash ROM is checked, and the ROM version is printed.

③ Display/Print

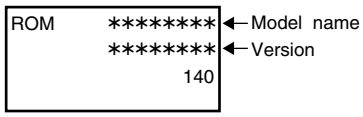
OP display

F	L	A	S	H		R	O	M			P	G	M	
1	3	0												

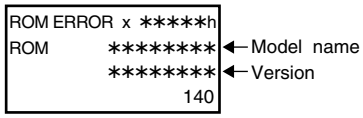
④ End of the test

After completion of the test, the end print is made and the test is automatically terminated.

Print



Error print



∗ x = 1 : Data error, x = 2 : Address error
∗ In case of an error, the error address is printed on "*****" after the abnormal end print.

13) AD CONVERSION PORT TEST

① Key operation

160 → PO

② Details of the test

The AD conversion port voltage is displayed. TM (printer thermal head temperature) is displayed. When any key is pressed, VPTES (printer voltage) is displayed in 9 bits.

③ Display/Print

OP display

A	/	D		T	E	S	T					P	G	M	
								T	M		=		X	X	X

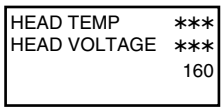
Press any key.

A	/	D		T	E	S	T					P	G	M	
								V	P		=		X	X	X

④ End of the test

When any key is pressed with VPTEST displayed, the end print is made and the test is automatically terminated.

Print



14) USB COMMUNICATION TEST

① Key operation

520 → PO

② Details of the test

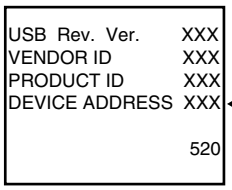
The USB revision, the vendor ID, the product ID, and the device address assigned by the host are printed.

③ Display/Print

OP display

U	S	B		T	E	S	T	1				P	G	M	
5	2	0													

Print


USB Rev. Ver. XXX
VENDOR ID XXX
PRODUCT ID XXX
DEVICE ADDRESS XXX
520
When the host is connected : 1~127
When the host is not connected : 0

④ End of the test

After completion of printing, the test is terminated.

15) SLEEP MODE TEST

① Key operation

550 → PO

② Details of the test

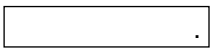
After execution of the diag, the machine enters the sleep mode.

③ Display/Print

OP display

.															

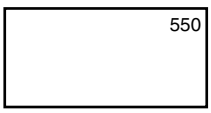
Rear



④ End of the test

When any key is pressed, the machine restores from the sleep mode. The following print is made and the diag is terminated.

End print



16) SD CARD TEST

① Key operation
620 → PO

② Details of the test
The SD card is detected and the write protect status is displayed. After completion of the test, the SD card register value is printed.

③ Display/Print

OP display

S	D		T	E	S	T	1					P	G	M	
6	2	0											X	–	Y

∗ X = SD card detection
1 : SD card YES 0 : SD card NO

∗ Y = WP detection
1 : WP state 0 : WP NO

④ End of the test
When any key is pressed, the SD card register is read and the end print is made.

Print

```
CID  XXXXXXXXXXXXXXXX--
     XXXXXXXXXXXXXXXXh
CSD  XXXXXXXXXXXXXXXX--
     XXXXXXXXXXXXXXXXh
OCR                12345678h
                          620
```

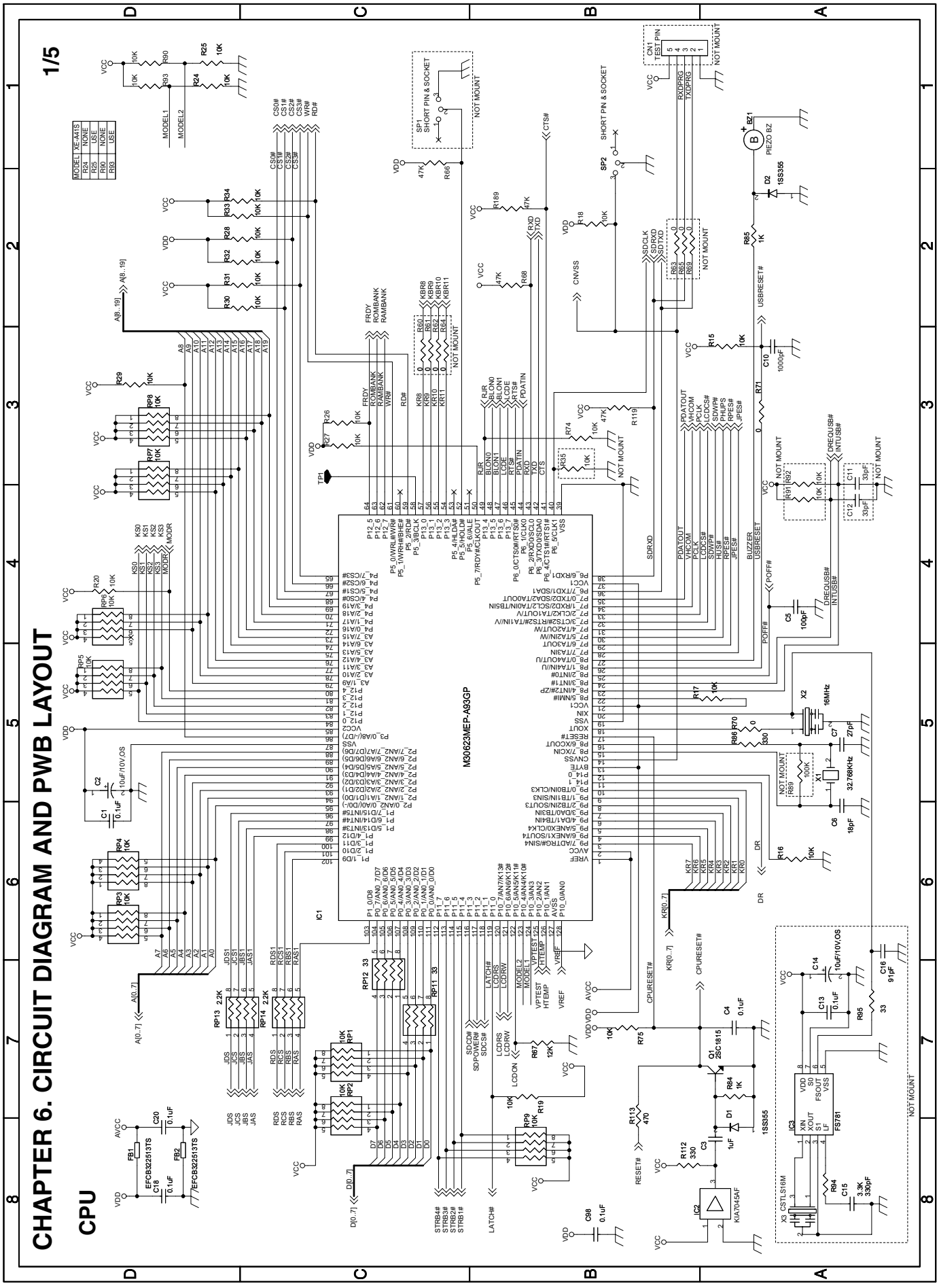
Error print

```
SD TEST ERROR
                   ******
                      620
```

∗ "******" = Error print

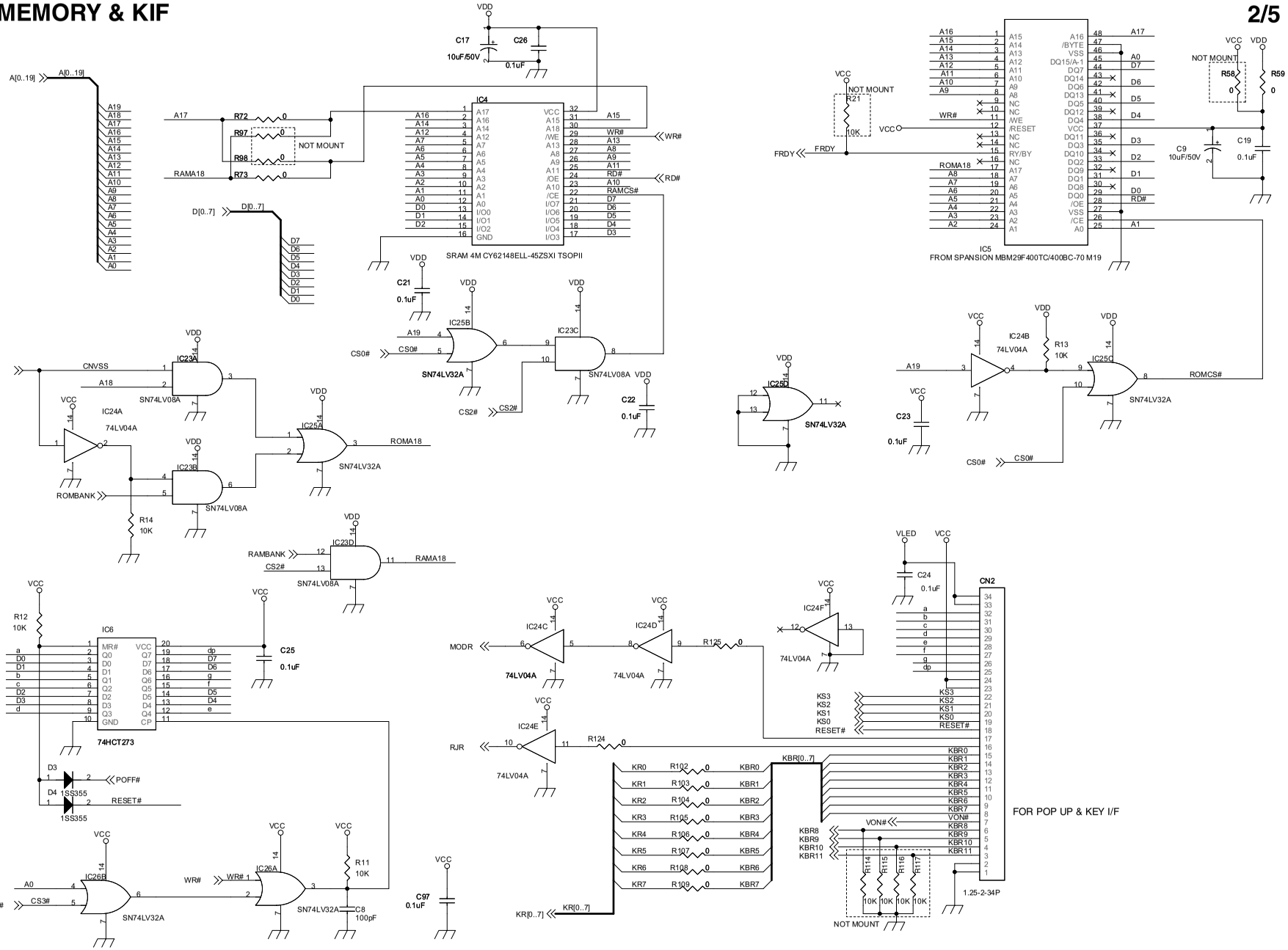
Error print list

Error print	Error content
CARD NO DETECT	SD Card not detected
READ ERROR	SD read error


CHAPTER 6. CIRCUIT DIAGRAM AND PWB LAYOUT
1/5
CPU
M30623MEP-A93GP
IC1
IC2
IC3
KIA7045AF
FS761
1SS355
2SC1815
PIEZO BZ
SHORT PIN & SOCKET
NOT MOUNT
MODEL1
MODEL2
XE-A41S
NONE
USE
16MHz
32.768KHz
CSTLS16M
EFCB322513TS
CPURESET#
RESET#
LATCH#
USBRESET#
BUZZER
POFF#
SDRXD
SDTXD
SDCLK
RXDPRG
TXDPRG
CNVSS
VCC
VDD
AVCC
GND

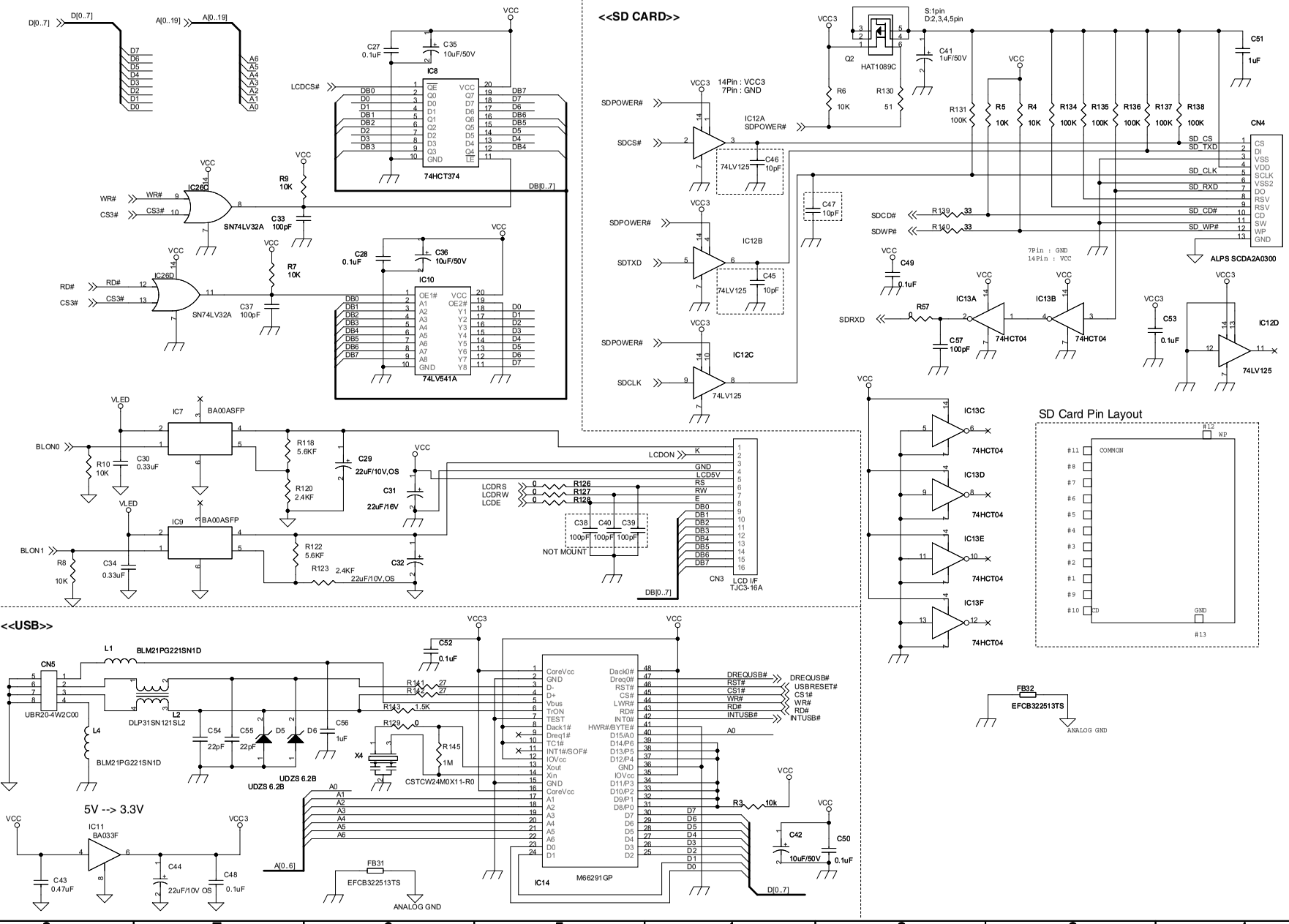
MEMORY & KIF

2/5



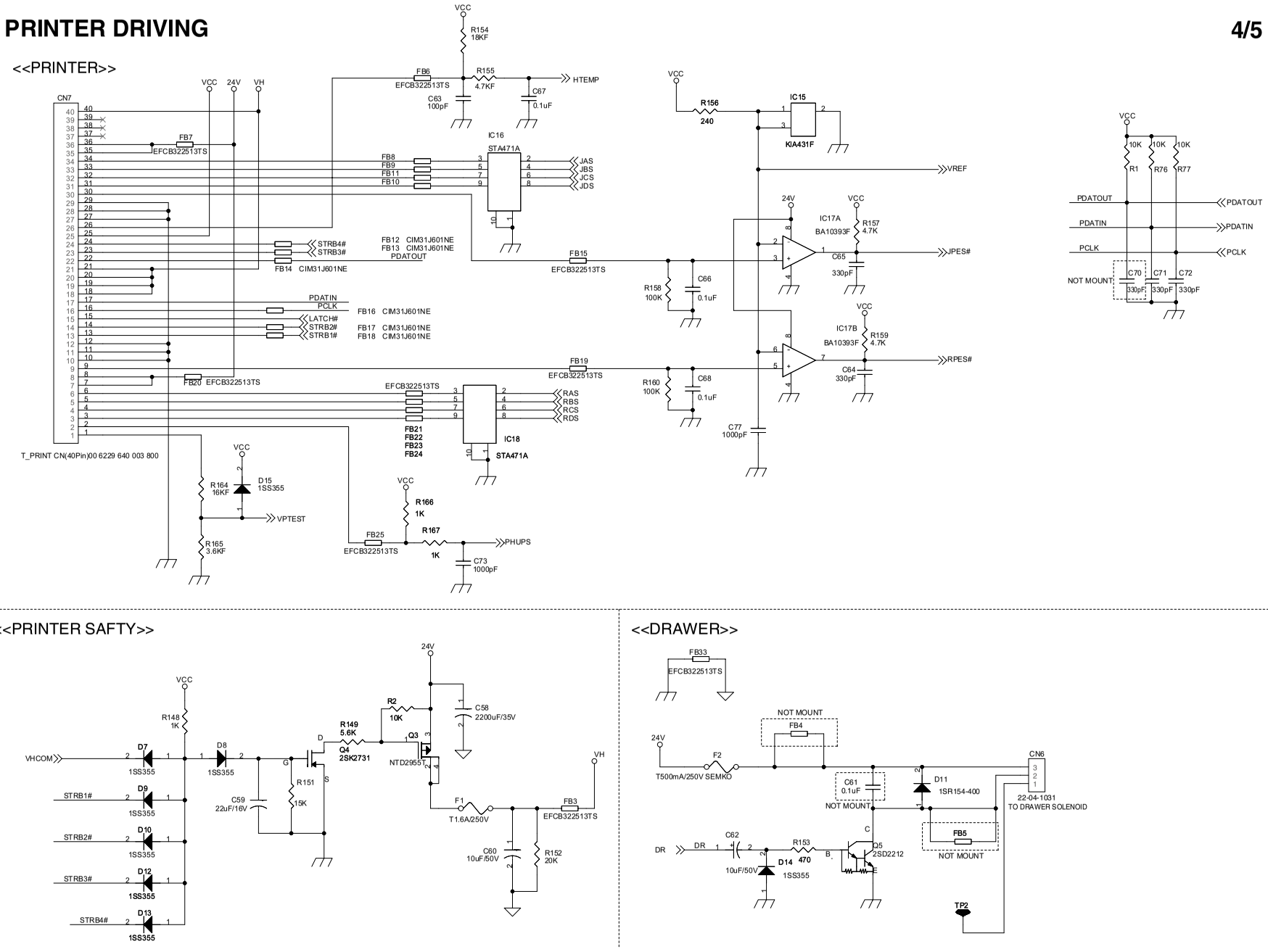
SD & USB

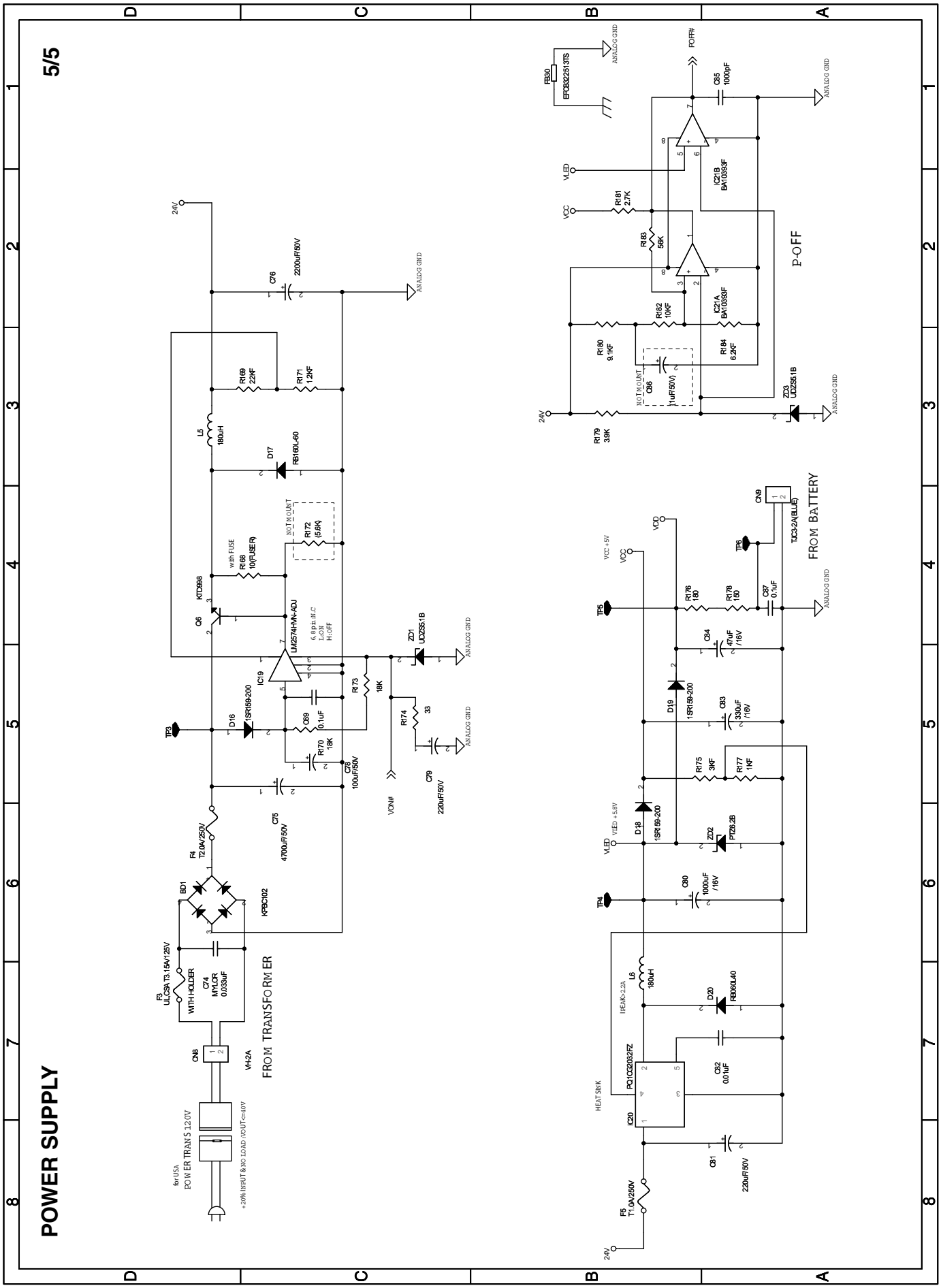
3/5


<<SD CARD>>
<<USB>>
SD Card Pin Layout
74HCT374
74LV541A
SN74LV32A
74LV125
74HCT04
BA00ASFP
BA033F
M66291GP
CN3 LCD I/F TJC3-16A
CN4
CN5
ALPS SCDA2A0300
HAT1089C
UBR20-4W2C00
DLP31SN121SL2
BLM21PG221SN1D
CSTCW24M0X11-R0
EFCB322513TS
UDZS 6.2B
5V --> 3.3V
ANALOG GND
NOT MOUNT
14Pin : VCC3
7Pin : GND
S:1pin
D:2,3,4,5pin
7Pin : GND
14Pin : VCC

PRINTER DRIVING

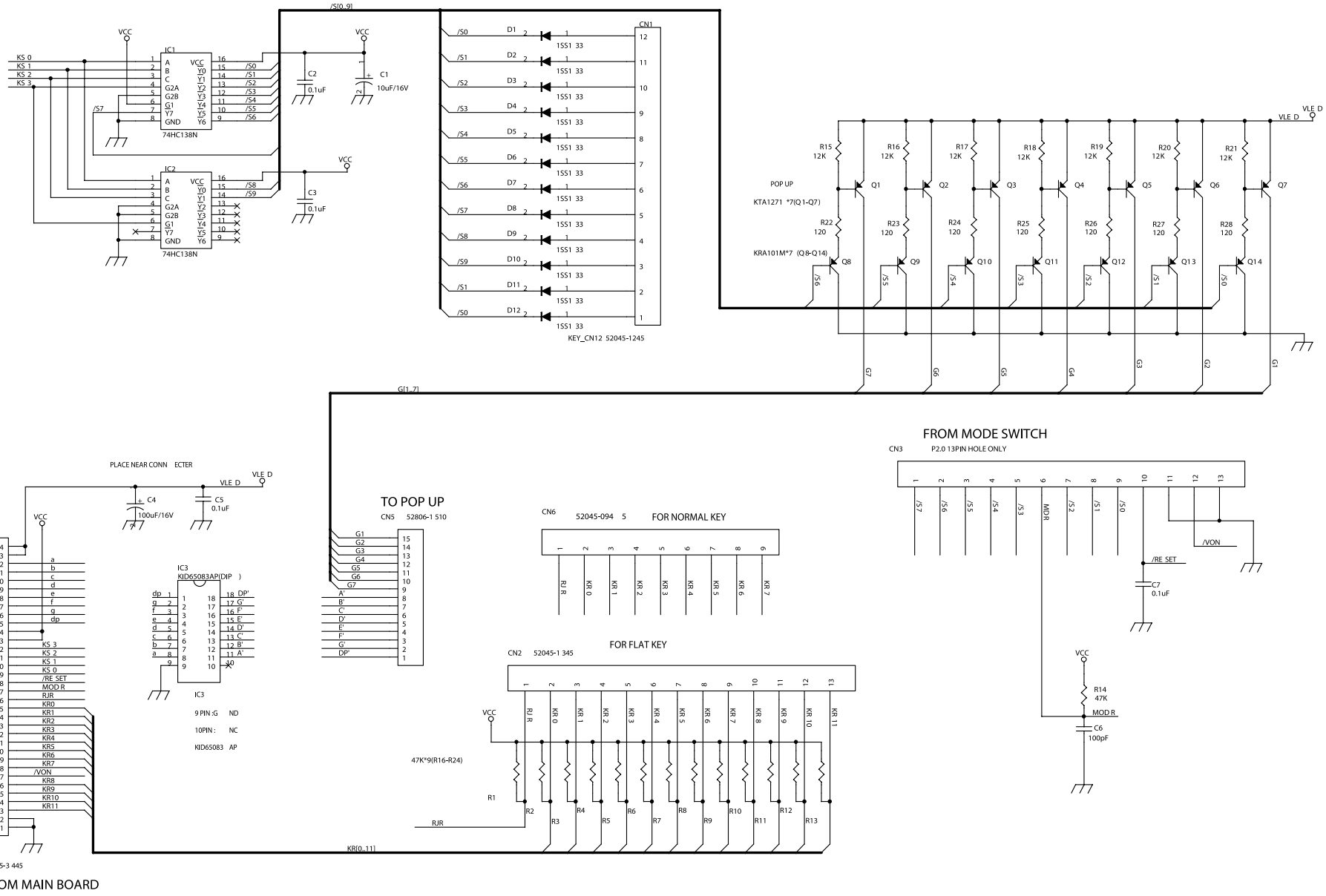
4/5

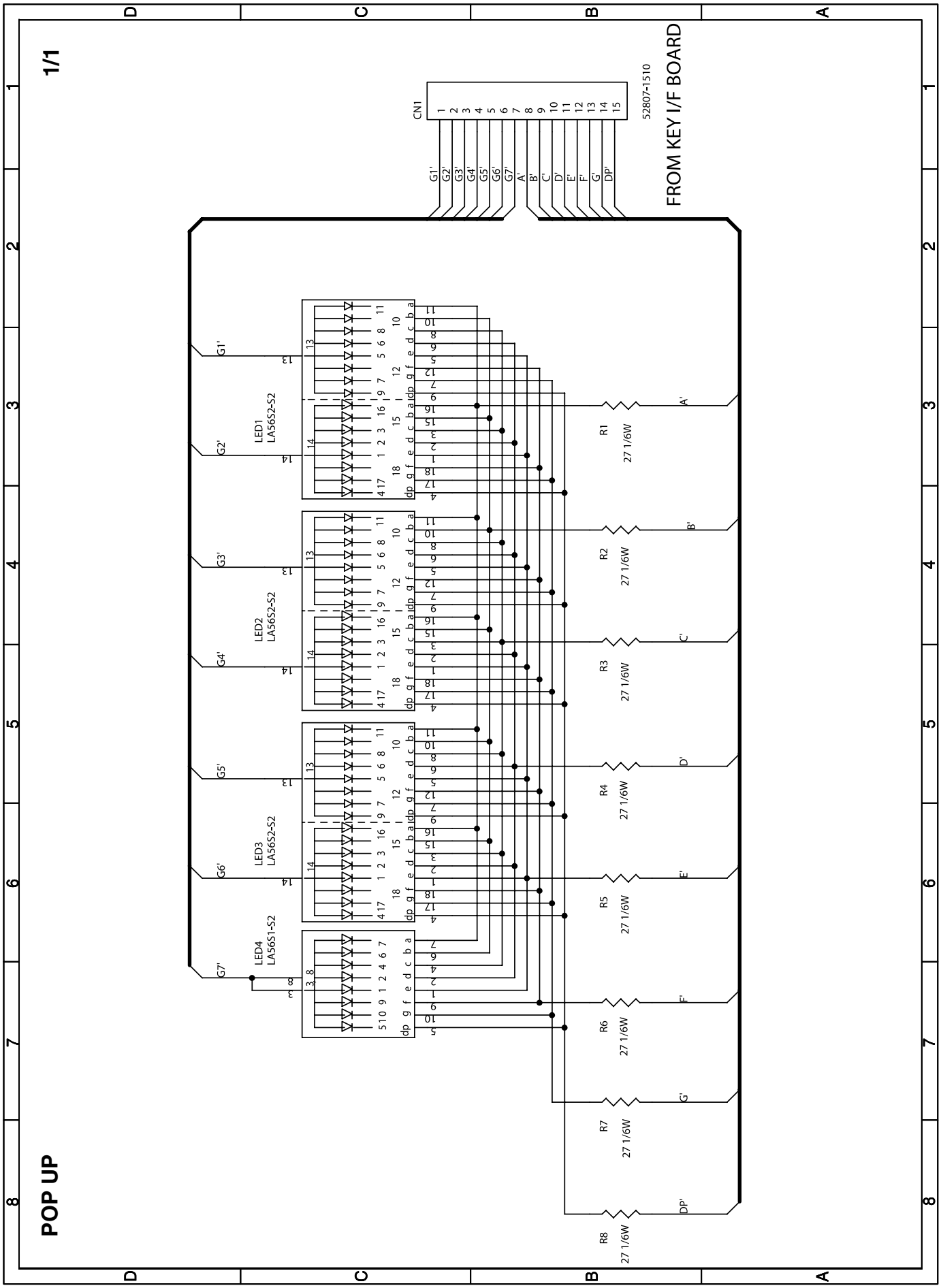



5/5
POWER SUPPLY
FROM TRANSFORMER
FROM BATTERY
P-OFF
for USA
POWER TRANS 1.2.0V
+20% INPUT & NO LOAD :VOUT<=40V
VH-2A
CN8
F3
UL/CSA T3.15A/125V
WITH HOLDER
C74
MYLOR
0.033uF
F4
T2.0A/250V
BD1
KBPC102
C75
4700uF/50V
C76
2200uF/50V
L5
180uH
D17
RB160L-60
R169
22KF
R171
1.2KF
Q6
KTD998
with FUSE
R168
10(FUSER)
NOT MOUNT
R172
(5.6K)
IC19
LM2574HVN-ADJ
ON/OFF
L:ON
H:OFF
ZD1
UDZS5.1B
R173
18K
C69
0.1uF
R170
18K
D16
1SR159-200
TP3
C78
100uF/50V
R174
33
C79
220uF/50V
VCN#
ANALOG GND
24V
F5
T1.0A/250V
IC20
PQ1CG20J2FZ
HEAT SINK
L6
180uH
D20
RB060L40
C82
0.0uF
C81
220uF/50V
D18
1SR159-200
ZD2
PTZ6.2B
C80
1000uF
/16V
D19
1SR159-200
C84
47uF
/16V
C83
330uF
/16V
R175
3KF
R177
1KF
R176
1KF
R178
150
C87
0.1uF
TP4
TP5
TP6
CN9
TCC32-2A(BLUE)
VCC
VDD
VLED
VCC+5V
VLED+5.6V
R180
9.1KF
R182
10KF
R183
56K
R184
6.2KF
R181
2.7K
C86
(1uF/50V)
NOT MOUNT
IC21A
BA10358F
IC21B
BA10358F
ZD3
UDZS5.1B
R179
39K
FB30
EFCB2251-3TS
C85
1000pF
POFF#

KEY IF

1/1

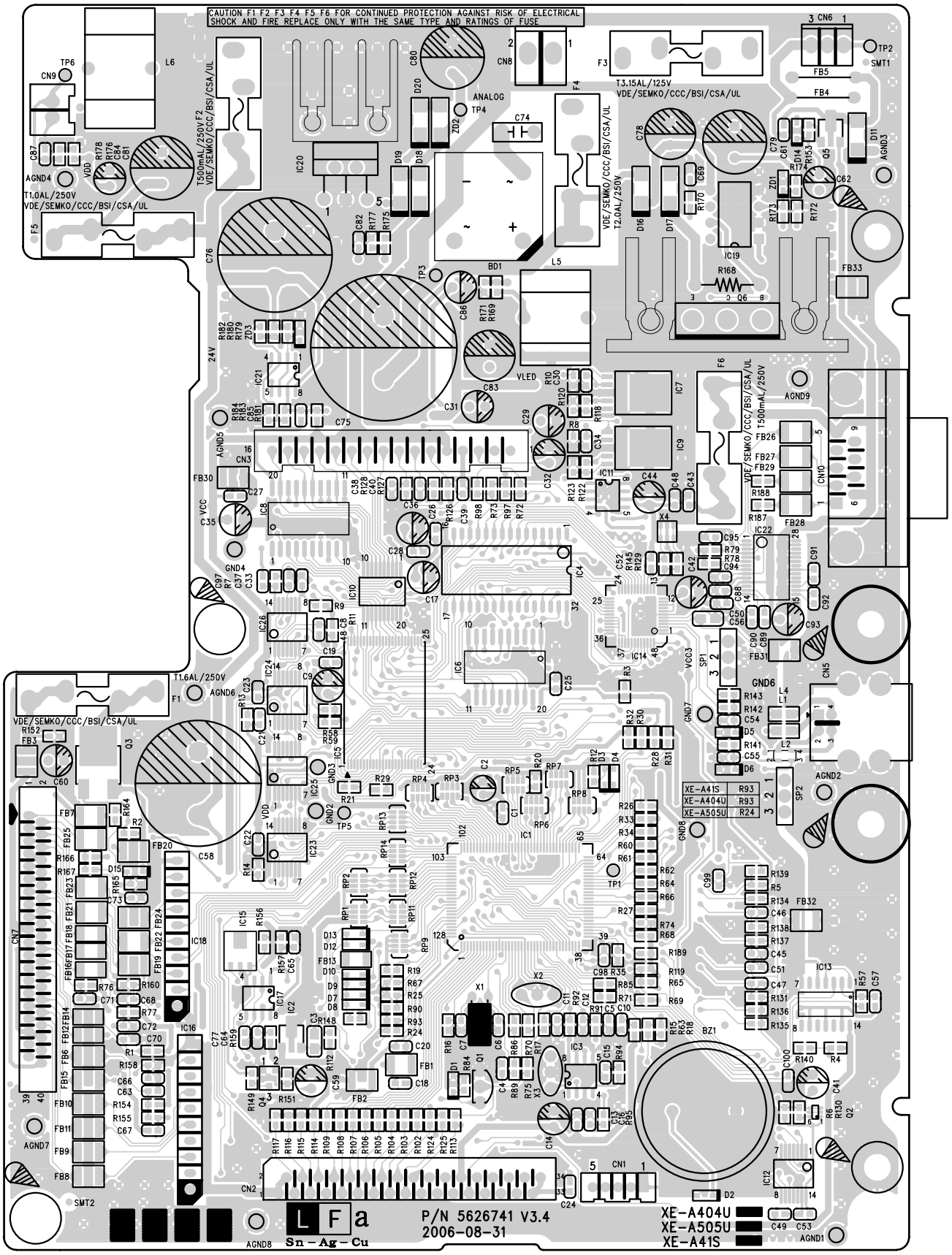

/S[0..9]
IC1
IC2
74HC138N
KS 0
KS 1
KS 2
KS 3
/S7
/S8
/S9
VCC
C1
10uF/16V
C2
0.1uF
C3
0.1uF
CN1
KEY_CN12 52045-1245
1SS1 33
VLE D
POP UP
KTA1271 *7(Q1-Q7)
KRA101M*7 (Q8-Q14)
R15 12K
R16 12K
R17 12K
R18 12K
R19 12K
R20 12K
R21 12K
R22 120
R23 120
R24 120
R25 120
R26 120
R27 120
R28 120
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
G[1..7]
PLACE NEAR CONN ECTER
C4
100uF/16V
C5
0.1uF
IC3
KID65083AP(DIP)
9 PIN :G ND
10PIN : NC
KID65083 AP
CN4
52045-3 445
FROM MAIN BOARD
KR[0..11]
TO POP UP
CN5 52806-1 510
CN6 52045-094 5
FOR NORMAL KEY
FOR FLAT KEY
CN2 52045-1 345
47K*9(R16-R24)
R1
RJR
FROM MODE SWITCH
CN3 P2.0 13PIN HOLE ONLY
/RE SET
/VON
MOD R
C7
0.1uF
R14
47K
C6
100pF


1/1
POP UP
FROM KEY I/F BOARD
CN1
52807-1510
G1'
G2'
G3'
G4'
G5'
G6'
G7'
A'
B'
C'
D'
E'
F'
G'
DP'
LED1
LA56S2-S2
LED2
LA56S2-S2
LED3
LA56S2-S2
LED4
LA56S1-S2
R1
R2
R3
R4
R5
R6
R7
R8
27 1/6W

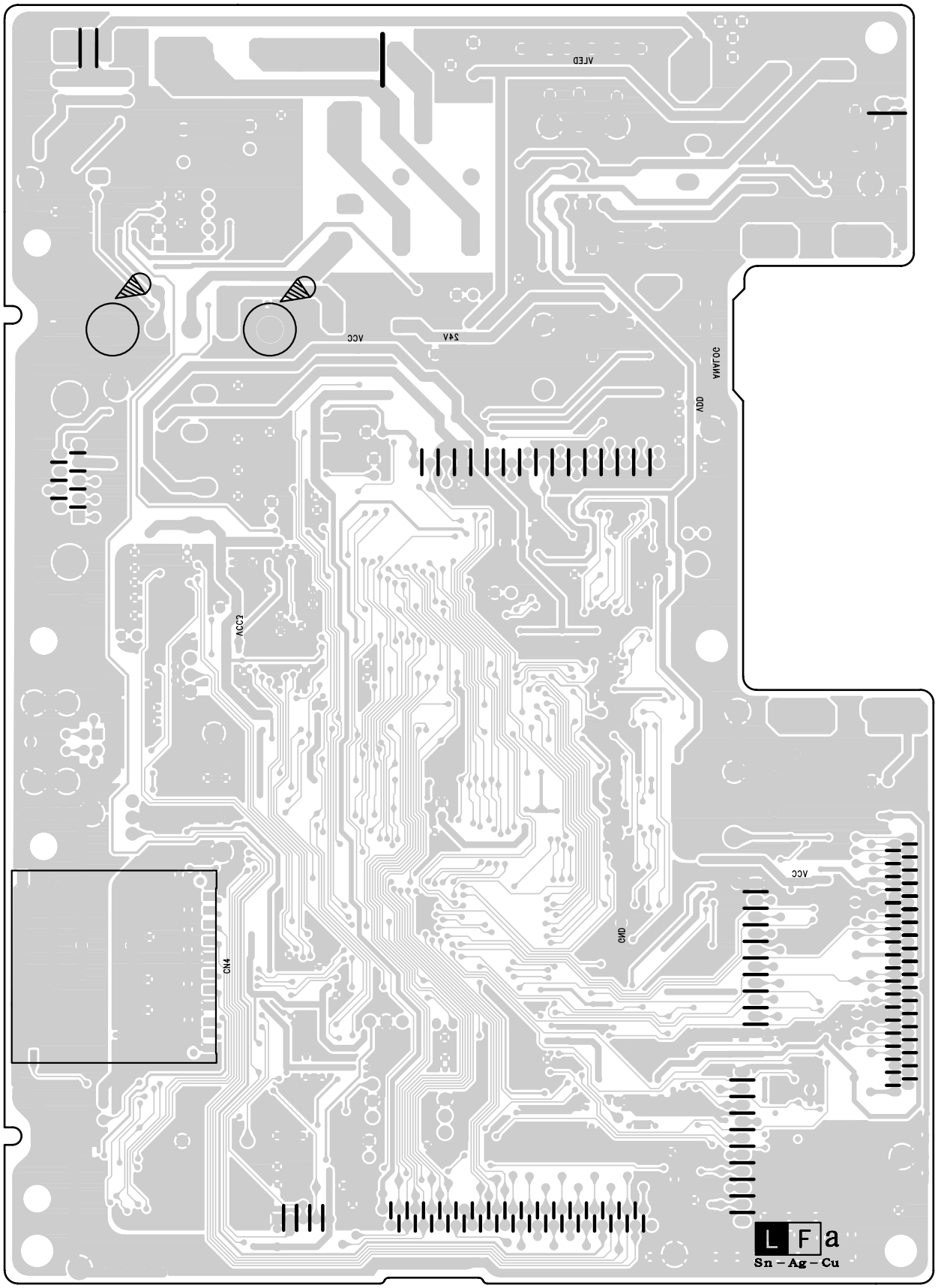
PWB LAYOUT

1. MAIN PWB LAYOUT

A. side



B. side



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